Written Statement

of

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Before the House Committee on Homeland Security

Subcommittee on Cybersecurity, Infrastructure Protection, and Security Technologies

"The DHS and DOE National Labs: Finding Efficiencies and Optimizing Outputs in Homeland Security Research and Development."

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Good morning Chairman Lungren, Ranking Member Clarke, and distinguished Members of the Subcommittee. I am pleased to testify today with my colleague from the Science and Technology Directorate (S&T), Deputy Under Secretary Daniel Gerstein. I appreciate the opportunity to highlight the important work executed by the Department of Homeland Security (DHS) and Department of Energy (DOE) laboratories to support and implement the global nuclear detection architecture (GNDA) and advance technical nuclear forensics.

As you know, the Domestic Nuclear Detection Office's (DNDO) unique mission requires coordination with multiple intra- and interagency partners to develop and enhance the GNDA; develop technical nuclear detection capabilities; measure detector system performance; ensure effective response to detection alarms; advance and integrate nuclear forensics efforts; conduct transformational research and development for nuclear detection and forensics technologies; and implement the domestic portion of the GNDA. Countering nuclear terrorism is a whole-of-government challenge, and DNDO works with Federal, State, local, tribal, international, and private sector partners to fulfill this mission.

DNDO work with S&T and DHS Laboratories

Within DHS, work at DHS National Laboratories is coordinated through S&T's Office of National Laboratories. DNDO works closely with S&T on operational support, test, and evaluation efforts relevant to the mission of both organizations, including evaluating nuclear detection capability of existing explosives detection systems and non-intrusive inspection radiography systems that can be used for nuclear and contraband. DNDO and S&T leverage joint needs and efforts efficiently through established DHS processes and integrated product teams.

A good example of our coordination is the Securing the Cities (STC) program. The STC program, initiated in the New York City region, is designed to enhance the nation's ability to detect and prevent a radiological or nuclear attack in the highest risk cities. In order to perform nuclear detection focused activities, DNDO has worked through S&T to engage with the National Urban Security Technologies Laboratory (NUSTL), formerly the Environmental Measurements Laboratory, to support STC in the New York City region. With support from the DOE Brookhaven National Laboratory, NUSTL ensures the sustainment of nuclear detection equipment purchased for STC operational partners. This includes the initial receipt of detection equipment, operations checks, and distribution of STC equipment for all regional partners. NUSTL provides training equipment for radiation detection courses and radiological sources for training and exercise purposes. NUSTL also supports the STC program by providing for receipt, storage, and shipping of training materials, and provides subject matter expertise to the STC committees.

Beyond STC, NUSTL also assists with DNDO's technology test and evaluation activities by providing test scientists and technical expertise supporting test plan development and execution. Most recently, NUSTL staff supported the Gryphon test campaign with a test scientist to help prepare and conduct the evaluation of airborne radiation detection equipment.

Additionally, DNDO has collaborated with S&T's Transportation Security Laboratory (TSL) to evaluate the potential of existing explosives detection systems for detecting radiological or nuclear threats in baggage or small cargo at airports. DNDO worked with TSL to utilize their expertise and facilities for testing equipment used in airport environments. TSL focuses on explosives detection, and their specialized facilities, labs, and knowledgeable teams have proved a good partner for this effort.

DNDO work with DOE National Laboratories

Much of the Nation's expertise in nuclear weapons and technical nuclear issues resides at the DOE National Laboratories and they serve as an important partner in preventing nuclear terrorism. This work is also coordinated through the S&T Office of National Laboratories. DNDO utilizes the National Laboratories across its mission space to execute, support, advance, and analyze our work on nuclear detection and forensics, as appropriate. My testimony outlines the funding spent at the National Laboratories and highlights some of the important, collaborative work conducted over the past few years.

Architecture planning

DNDO engages with the National Laboratories to study the architecture and inform the development of plans for future implementations of the GNDA. This includes studies and analyses of the threat, adversaries, technical capabilities, and architecture pathways. This work informs the prioritization and implementation of the nuclear detection architecture by providing a framework for determining our ability to reduce risk and efficiently deploy resources.

The National Laboratories support DNDO's efforts to analyze and improve the GNDA through the development of specific architecture studies, Concept of Operations analyses, and detector modeling efforts. National Laboratory support of DNDO architecture studies typically focuses on specific programs, operating environments, modes of transportation, and/or specific threats and directly feeds into and supports the ensuing solutions development process. The National Laboratories also provide important inputs and support for annual and Congressionally-mandated architecture documentation, like the Joint Interagency Annual Report on the GNDA and the Radiological and Nuclear Terrorism Risk Assessment.

Nuclear Detection Research and Development

Part of DNDO's mission includes leading and conducting research and development activities for nuclear detection and forensics. The National Laboratories play a critical role in providing innovative ideas, establishing technical feasibility, developing prototype systems, and supporting characterization and analysis for transformational and near-term research and development projects.

Annually, DNDO releases a competitive Call for Proposals (CFP) for Exploratory Research to the National Laboratories and other federal centers. The competitive CFP solicits proposals that may lead to dramatic improvements in national capabilities for nuclear/radiological detection and forensics. Topics areas for this research are defined from prioritized gaps in the GNDA,

technology needs defined by DNDO and DHS operational components, and remaining technology hurdles discovered in prior research. National Laboratories are encouraged to compete for project funding early-stage exploratory research. National Laboratories have contributed to advances in many technical areas including detector materials development, passive detection techniques, neutron detection and helium-3 replacement technologies, shielded special nuclear material (SNM) detection, modeling and algorithms, and nuclear forensics. In FY 2012, DNDO is supporting 11 Exploratory Research projects at the National Laboratories, focusing on early-stage and basic research that can be developed into new technologies for improving nuclear detection capabilities or operations.

The National Laboratories also provide technical expertise, technology characterization planning, and data analysis support to DNDO's Advanced Technology Demonstration (ATD) Program. This program strives to take innovative technology that has been proven in a laboratory environment, often by a National Laboratory, from a laboratory bench top prototype into a full scale performance test unit, and characterize its performance in a simulated operation environment. The National Laboratories have played a major role in each of the eight ATD projects initiated to date. We recognize and leverage the fact that they have the proper mix of technical expertise and scientific rigor to assist in the development and characterization of advanced technology.

Program Support for Deployments
Another important area of ongoing work with National Laboratories is in the field of program support. DNDO uses National Laboratories to provide specialized technical support services. For example, DNDO has a long and continuing relationship with the Pacific Northwest National Laboratory (PNNL) to support deployment and calibration, as well as analyses, tests, and developmental technology studies for the Radiation Portal Monitor (RPM) program. In this role, PNNL has supported the RPM program throughout the purchase and deployment of current-generation systems and DNDO has further leveraged the laboratory's expertise to provide analyses of possible improvements, life extensions, and other related work on RPMs. Similarly, other National Laboratories also provide work to develop and test relevant technologies.

Test, Evaluation, and Standards
Testing and evaluation of nuclear detection systems is a key area where DNDO leverages DOE National Laboratory facilities and expertise. For test infrastructure, DNDO has worked closely with DOE National Laboratories and other DOE facilities. Our standards-based testing must be augmented with government-sponsored performance and scenario-based testing against threat quantities of special nuclear materials. This type of testing can only be conducted at specially designed and secure facilities. To this end, DNDO constructed the Radiological and Nuclear Countermeasures Test and Evaluation Complex at the Nevada National Security Site. This facility was designed to be the Nation's premier test complex for evaluating radiological and nuclear detection systems against significant quantities of highly enriched uranium and plutonium. DNDO also maintains testing capabilities across the National Laboratory complex to fulfill unique developmental, performance, and operational testing needs.

For example, DNDO's collaboration with the European Union's (EU) Joint Research Center (JRC) and the International Atomic Energy Agency on a three-year effort known as the Illicit Trafficking Radiation Assessment Program (ITRAP+10) to survey the world market for radiological and nuclear detection systems is supported by several DOE National Laboratories. Collectively, the U.S. and our European partners will test nearly 100 devices across nine different categories of detection equipment. To date, devices have been proposed for testing by 27 vendors from 11 countries. Testing is underway at the EU-JRC's facility in Ispra, Italy, and at the Savannah River National Laboratory, Oak Ridge National Laboratory (ORNL), and PNNL. ITRAP+10 will provide the opportunity to ensure that standards for radiological and nuclear detection devices are clearly defined, comprehensive and realistic, and promote greater homogeneity in United States and international detection standards. Once completed, the tests will provide Federal, State, and local law enforcement valuable information about which radiological detection and identification instruments can best serve their operational needs. In addition, manufacturers will gain insights that may allow them to improve devices that are already available or in development.

In addition, DNDO's Graduated Radiological/Nuclear Detector Evaluation and Reporting (GRaDER®) Program enables manufacturers to have their commercial, off-the-shelf radiological and nuclear detection equipment tested by various DOE National Laboratories that have been accredited by the National Institute of Standards and Technologies under the National Voluntary Laboratory Accreditation Program. The purpose of the GRaDER® program is to determine whether these radiation detectors comply with national consensus and technical capability standards adopted by DHS, allowing our operational partners in Federal, State, local, and tribal agencies to make better-informed decisions on the procurement of radiological and nuclear detection equipment. DOE National Laboratories are important partners in this effort.

Training, Exercise and Assistance Support
DNDO's training, exercise, and assistance activities use National Laboratories to help establish standards and templates for GNDA activities as implemented by State and local entities. These standards and templates will make it possible for the GNDA to be implemented in a consistent manner across the country, while allowing flexibility for local law enforcement to tailor their programs to meet their needs. Once established, these standards and templates will be sustained by DNDO and the National Laboratories.

Analyses and Reachback
DNDO's Joint Analysis Center (JAC) provides a centralized support capability for the GNDA and its technical underpinnings rely on the expertise at DOE weapons laboratories. The JAC is a 24/7 information and analysis center that provides for situational awareness of the deployed nuclear detection architecture, timely information reporting, and facilitation of technical support for alarm adjudication and resolution. The JAC relies on the National Laboratory-based Secondary Reachback (SRB) Program to provide expert advice and analysis in support of detection operations and adjudication of alarms. SRB scientists also coordinate with the DOE Triage program to assist in the adjudication of detection alarms. The integration of both

programs ensures efficiency and consistency by providing technically qualified experts available through Triage and SRB to support operations in the field. The JAC also relies on the Nuclear Assessment Program conducted at the National Laboratories to provide expert technical advice on efforts to define, monitor, and update the evolution of the GNDA.

Red Team Support
DNDO's Red Team activities provide a valuable service for DNDO and our partners, allowing evaluation and assessment of deployed assets and capabilities in an operational environment against realistic threat scenarios. DNDO uses DOE National Laboratory expertise to provide technical, operational, and threat device support for Red Team efforts.

For example, DNDO has engaged Lawrence Livermore National Laboratory (LLNL) to provide operational support to our Red Team's overt and covert testing program that assesses various operational elements of the GNDA. LLNL provides subject matter expertise in detector technology and assists with health physics and source handling to ensure all assessments are conducted in a manner which is safe for the law enforcement officers, the assessment team and the general public.

Likewise, DNDO has engaged ORNL to research, develop, manufacture and deploy unique radiological signature test devices with unique nuclear signatures for use in our overt and covert testing program. These test devices allow DNDO's Red Team efforts to present realistic threat signatures to various operational elements of the GNDA, as well as enabling opportunities for technology test and evaluation scenarios against threat sources. These test devices present operators with radioactive threat signatures that are not normally seen in daily operations and provide a unique opportunity to exercise the adjudication process from the point of detection up through various levels of analysis and response.

Finally, DNDO engaged Los Alamos National Laboratory (LANL) to develop the Probabilistic Effectiveness Methodology (PEM). PEM is a software modeling and simulation tool that replicates adversary motivation, capabilities, and intent; adversary transportation pathways (air, land, and sea), the performance of detector architectures, and individual detector performance. PEM allows for the identification of GNDA gaps and vulnerabilities from an adversary's perspective, modeling various elements of the GNDA and simulating adversary action. In addition, the PEM model can be used to reflect changes in the GNDA and/or adversary capabilities that may impact those gaps and vulnerabilities.

Technical Nuclear Forensics
The field of technical nuclear forensics involves examining materials recovered from radiological or nuclear events of an illicit or hostile nature in order to determine their character and origin. Technical nuclear forensics (TNF) enhances deterrence through improved nuclear security and augments effective national response to such incidents. TNF provides clues to identification and prosecution of illicit smuggling networks and aids attibrution of planned and actual attacks.. The DNDO National Technical Nuclear Forensic Center mission is four-fold: 1)

provide centralized stewardship for planning, assessments, and integration of all Federal nuclear forensics and attribution activities, 2) advance the capability to perform nuclear forensics on nuclear and other radioactive materials in a pre-detonation (intact) state, 3) through its expertise development efforts, ensure a robust and enduring technical nuclear forensics workforce and pipeline, and 4) maintain the *National Strategic Five-Year Plan for Improving the Nuclear Forensics and Attribution Capabilities of the United States* and annually submit the corresponding Joint Interagency Annual Review. To fulfill this mission, the United States government, and particularly DNDO, relies upon the preeminent expertise residing in eight DOE National Laboratories and two standards development laboratories to conduct nuclear forensics analyses and improve methods through research and development. Laboratory measurements determine physical, chemical, and isotopic properties of materials to provide insights about the material processing history, potential geographic origins, transport pathways, and intended use of the materials.

As mandated in the Nuclear Forensics and Attribution Act, DNDO also leads an interagency effort to restore the expertise pipeline and provide a stable foundation to develop and maintain a highly qualified nuclear forensics workforce through the National Nuclear Forensics Expertise Development Program (NNFEDP). This program is creating an academic pathway from undergraduate to post-doctorate study in a variety of nuclear and geochemical science specialties directly relevant to technical nuclear forensics, such as radiochemistry, nuclear engineering and physics, isotope geochemistry, materials science, and analytical chemistry. The NNFEDP addresses a pressing need to grow the next generation of scientists in these critical fields which have experienced a decline in recent decades. The program promotes an interdisciplinary approach that emphasizes collaboration among academic programs, universities, and the national laboratories, to include providing nuclear forensics-related research and mentorship opportunities at the DOE National Laboratories to students at the undergraduate, graduate, and post-doctorate levels.

Interagency Coordination

In order to effectively and efficiently use resources at the DOE National Laboratories, coordination across the USG is essential. While coordination and collaboration with partners has been ongoing since DNDO's inception, the Mission Executive Council (MEC) was created in 2010 as a forum for USG to identify and plan strategic science, technology and engineering (ST&E) capabilities at the National Laboratories. The MEC meets regularly with representatives from across the interagency to ensure that the finite resources at the laboratories are managed appropriately and work is aligned with the most pressing national security needs. S&T and DNDO both have representation on the MEC to facilitate interagency identification of joint scientific and technical requirements that support national security efforts.

Overview of DNDO Funding at DOE National Laboratories

DNDO has obligated a considerable amount of our funding to the National Laboratories for important work on the GNDA and technical nuclear forensics over the past six fiscal years (FY).

In FY 2012, DNDO expects to obligate approximately $43 million to DOE National Laboratories, including current-year and prior year appropriations funds. This decrease in funding from prior years is due to significant budget reductions in FY 2012, especially in the Transformational Research and Development and Systems Acquisition areas. In recent years, the majority of funding obligated to DOE National Laboratories has been concentrated on efforts to support research, development, testing, and evaluation, as well as operations support activities, in contrast to earlier funding dedicated to program support for deployment. These investments partially support laboratory overhead costs for research activities.

Path Forward

As I previously mentioned, coordination is a key element of our work with the DHS and DOE National Laboratories. This coordination extends to our planning and prioritization of projects. Our approach at DNDO is evolving at every level to be disciplined and rigorous, while prioritizing our work to make the best use of limited resources. We seek to use the available expertise at our laboratories to implement a responsive, agile nuclear detection architecture and strengthen our nuclear forensics capabilities. While overall funding to DOE National Laboratories from DNDO may be decreasing, due to present fiscal realities, they remain a vital asset for national security research, development, analyses, testing, and program support.

Chairman Lungren, Ranking Member Clarke, I thank you for this opportunity to discuss our work with DHS and National Laboratories and the progress of DNDO. I am happy to answer any questions from the Subcommittee.